Amendments to Specification

Page 3, lines 4-15:

As illustrated in Fig. 2, the prior art process requires a hot lamination step 43 to provide the anode substrate 14 with the impregnated seal 31. A similar hot lamination step 44 is required to provide the cathode substrate 26 with the impregnated seal 32. Then, a third hot lamination step 45 is required to join the substrates 14, 26 with the catalyst coated membrane 11, 12, 22, in order to produce the unitized electrode assembly 40. The flow field plates 18, 27 have their respective ~~foam~~ silicon rubber gaskets 35, 36 adhered to them by pressure sensitive adhesive 37, 38 in compression steps 46, 47 to provide fuel and oxidant flow field plates with seals 48, 49. These are then brought together, along with other, similar fuel cell components to form a fuel cell stack assembly 50.

Page 3, line 26 to page 4, line 15:

According to the present invention, the thermoplastic film impregnated into the anode substrate and the cathode substrate so as to form respective gas edge seals is utilized in providing a gas edge seal between at least one substrate and a corresponding reactant gas flow field plate, which may comprise a water transport plate in some embodiments. In a first embodiment of the invention, the edge seal impregnated thermoplastic is used as the bond between each substrate and a corresponding ~~closed cell foam~~ silicon rubber gasket, the gasket sealing the joint between the respective reactant gas flow field plate and corresponding substrate when the fuel cell parts are compressed together in the process of forming a fuel cell stack. According to another embodiment of the invention, at least one reactant gas flow field plate is bonded directly to a corresponding substrate by means of the impregnated edge seal thermoplastic of the corresponding substrate. The invention not only provides adhesion which will last well in excess of 10,000 hours of

operation, but it also reduces the number of steps required to form a fuel cell, and to form a fuel cell stack.

Page 5, line 6 to page 6, line 20:

Fig. 3 illustrates one aspect of the present invention. Therein, the silicone rubber closed cell foam gasket 35 or 36 is adhered directly to a related one of the substrates 14 or 26, respectively, by the related sealant material 31 or 32 during the hot lamination which causes the substrate 14 or 26 to become impregnated with the plastic. The sealant material may be a thermoplastic polymer, a thermoset polymer, or an elastomeric polymer. The sealant material may be a film, a coating, an extrusion or any form that is conducive to high speed manufacturing. This process is illustrated in Fig. 4, in which a single hot lamination process 45a not only impregnates the anode substrate 14 and the cathode substrate 14, but it joins those substrates together with the ~~foam~~ gaskets 35 or 36 and the catalyst coated membrane 11, 12, 22. This forms a unitized electrode assembly with gaskets 51, which only need be combined with the fuel flow field plate 18 and the oxidant flow field plate 27 together with other similar fuel cell components to form the fuel cell stack assembly 43. Thus, instead of the three hot lamination steps 43, 44, 45 in the prior art process illustrated in Fig. 2, only one hot lamination step 45a is required in accordance with this aspect of the present invention.

A further aspect of the invention is illustrated in Fig. 5. Therein, the gasket 35 is adhered by means of the thermoplastic 31 to the anode substrate 14, as described with respect to Fig. 3. But, the cathode substrate 26 is not provided with a gasket. Instead, the oxidant flow field plate 27 is adhered directly to the cathode substrate 26 by means of the thermoplastic material 32 at the time that the thermoplastic material 32 is impregnated into the cathode substrate 26. The fuel flow field plate 18 is joined by a thermoplastic material 53 to the oxidant flow field plate 27, thus eliminating one gasket and eliminating the need to shape the oxidant flow field plate with a notch to accommodate a gasket, as is illustrated in

Fig. 3. Thus, an integral fuel cell is formed when this aspect of the invention is employed. The fuel call can be unitized with a single hot lamination process 45b, as illustrated in Fig. 6, which provides a fuel cell with gasket 9a. In such a case, only assembly is required to bring all of the fuel cells together in a fuel cell stack 43, in which the ~~foam~~ silicon rubber gasket 35 of one fuel cell will mate into the notch of a fuel flow field plate 18 of an adjacent fuel cell. The invention may, instead, adhere the fuel reactant flow field 18 to the anode substrate 14 and provide gaskets 36 on the cathode substrate 27. Of course, accommodations for the end cells will be made, which is well within the skill of the art in the light of the teachings herein.

Page 10, lines 1-16:

A ~~foam~~ silicon rubber gasket (35) is adhered to an anode substrate (14) by sealant material, such as a thermoplastic polymer, a thermoset polymer or an elastomeric polymer, which is impregnated (31) to provide an edge seal to the anode substrate. In one embodiment, a ~~foam~~ silicon rubber gasket (36) is adhered to the cathode substrate (26) by the sealant material which is impregnated (32) to provide a gas edge seal to the cathode substrate. Each fuel cell is completed during the formation of a fuel cell stack by compressing the fuel flow field plates and oxidant flow field plates to the unitized electrode assembly with gaskets. In a second embodiment, the oxidant flow field plate (27) is adhered to the cathode substrate by the sealant material which is impregnated into the cathode substrate to provide a gas edge seal, and the fuel flow field plate (18) is adhered to the oxidant flow field plate (27) by means of the sealant material (53). The entire fuel cell with gasket (9a) is formed in a single hot lamination step (45b).